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Marine Casualty Investigations

Enquêtes sur les accidents maritimes

Investigation Report to the Minister pursuant to sections 542 or 545 of the Canada Shipping Act

Rapport d'investigation au Ministre conformément aux articles 542 ou 545 de la Loi sur la marine marchande du Canada

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INVESTIGATION REPORT INTO THE CIRCUMSTANCES ATTENDING THE GROUNDING AND STRANDING OF THE CANADIAN COASTAL CARGO VESSEL "TOPSAIL STAR" IN BAY OF EXPLOITS, NEWFOUNDLAND, ON AUGUST 29, 1986.

REPORT No. 465

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Particulars of Vessel

Name	"TOPSAIL STAR"
Official Number	182559
Port of Registry	St. John's, Newfoundland
Call Sign	VOFW
Gross Tonnage	706
Net Tonnage	267
Length	61.265 m
Breadth	11.03 m
Depth	3.124 m
Draught (At time of incident)	2.59 m forward 4.15 m aft
Type	Coastal general cargo vessel
Built	1951 Burntisland, Scotland. Steel construction.
Propulsion	One, Polar diesel, 2SCSA, driving a single fixed-pitch propeller. Engine controlled from the engine-room
Cargo	Fishing gear, boats, frozen fish and general
Crew	13
Classification	None, ex Lloyds. Removed from class at owner's request, March 1983
Load line	Canadian LL2, endorsed May 1986, valid until November 1988.
Owners	Topsail Shipping Company Ltd. Topsail, Newfoundland

Charterers (Time)	Marine Atlantic (formerly C.N. Marine)

Navigating Equipment

Radar 1	Racal Decca 970 BT 'Bright Track', ranges .25 mile to 48 miles, fixed and variable range rings, electronic cursor, colour image, ship's head up, non gyro-stabilized
Radar 2	Decca RM914, ranges .25 mile to 48 miles, fixed range rings, bearing cursor, ship's head up, non gyro-stabilized
Radio Direction Finder	Marconi Lodestone, type 758
Echo Depth Sounder	Kelvin Hughes, visual and trace
VHF Radio 1	Sitex 891, Channels 0-80
VHF Radio 2	Clipper II, Channels 0-80
AM Radio 1	Marconi Seaway CMC
AM Radio 2	Navaho
AM Radio 3	Marconi CH100
AM Radio 4	Marconi Seaway CMC
Gyro Compass	Sperry SR120
Magnetic Compass	Fitted

Description of Vessel

The "TOPSAIL STAR" was built in 1951 and was originally named "LONDON". In 1964 she was sold and re-named "WINSOR TRADER". She was purchased by her present owner in 1967 and then given her present name.

From building until 1967 she traded on the European coasts and from 1967 to date (19 years), has traded on the Newfoundland/Labrador coasts.

She is a typical small steel general-cargo coaster with her engine-room and accommodation situated aft. The space

forward of the engine-room is divided by transverse bulkheads into a fore-peak, two lower holds and a deep-tank. A common tween-deck runs the length of the two holds and deep-tank.

She is double bottomed throughout her length from fore-peak to engine-room bulkhead providing 3 centrally divided double bottom tanks; one under No. 1 hold and two under No. 2 hold.

The vessel had been classed and had her load line assigned by Lloyds Register of Shipping until 1983 when this service was withdrawn at the owner's request.

She was in possession of a valid Canadian Steamship Inspection Certificate (SIC 17) which was due to expire May 14, 1987 and a valid Canadian Load Line Certificate (LL2) due to expire November 16, 1988. The class and limits of her voyages were Home Trade I, East Coast Canada.

NOTE:

1. All times in this report are expressed in Newfoundland Daylight Saving Time (UTC minus 2.5 hours).

2. A glossary of abbreviations and terms can be found following the Findings in this report.

Background

At 0200, on August 29, 1986, while enroute to Bridgeport, Newfoundland, the "TOPSAIL STAR" grounded and became stranded on a rock shoal in position 49°32'18"N, 54°53'18"W some 7.5 cables off Bridgeport Harbour entrance.

Extensive damage was incurred to her hull bottom plating and internal double bottom structure with ingress of sea water to some double bottom tanks.

At 1824, on September 1, having discharged all ballast, remaining cargo and part of her fuel oil, she was refloated with the aid of two other vessels and proceeded to St. John's, Newfoundland, under her own power and without further incident.

After dry docking at St. John's, estimates of permanent repairs were given at between 200,000 and 300,000 dollars, which was in excess of the vessel's insured value. Temporary repairs were made enabling the vessel to complete her time-charter which ended during the first week of December 1986.

There were no injuries or pollution as a result of this

casualty.

Narrative

The "TOPSAIL STAR" had loaded a full cargo (consisting of general merchandise, frozen fish and small fishing boats (together with their fishing gear) at various ports in northern Newfoundland and Labrador. The fore-peak, deep-tank and Nos. 1 and 2 double bottom tanks contained sea water ballast, while No. 3 double bottom tank contained diesel fuel.

The boats and gear were owned by fishermen from northern Newfoundland and were being returned to their various home ports due to suitable fishing conditions having ended at the close of the short, Labrador summer season. The other cargo was destined for various ports in northern Newfoundland.

The vessel had departed from Red Bay in southern Labrador at 0015 on August 28, and then visited a further 3 ports that day, namely, Harbour Deep, Triton and Cottrell's Cove, (popularly referred to as Cottle Cove) all in northern Newfoundland.

The vessel had stopped at Red Bay for 15 minutes and the passage to Harbour Deep had taken 12.5 hours, arriving at 1245 and departing for Triton at 1330. Arrival Triton was at 1950 with departure at 2200 for Cottrell's Cove. Arrival at Cottrell's Cove was at 2320 with departure for Bridgeport at 2400. The ETA at Bridgeport was 0230, August 29, where she was to discharge one fisherman's boat and gear.

As was usual the master undertook his own pilotage when arriving and departing from the outports of Newfoundland and Labrador; pilotage for those ports is not compulsory and in many cases pilots would not be available; in addition, Canadian vessels of 1,500 tons gross tonnage or less are not compelled to hire pilots when trading on the east coast of Canada.

On departure from Cottrell's Cove at 2400, August 28, the "TOPSAIL STAR's" bridge was manned as follows:

The master	-	Piloting by use of the No. 1 radar and directing the helmsman to steer the required courses by gyro compass.
The boatswain	-	Assisting the master and monitoring the actions of the helmsman.

The helmsman - Steering by the hydraulic steering system in response to the master's orders.

A seaman - Keeping a lookout and advising the master of visually observed dangers.

At approximately 0030, on August 29, after clearing the land, the master left the ship's bridge for approximately 60 minutes in order to rest in his cabin. The bridge was then in the charge of the boatswain assisted by the helmsman who was steering (there was no automatic steering system) and the lookout. At 0130 the master was recalled to the bridge by the boatswain in response to his (the master's) orders to advise him when the ship was 6 miles, or approximately 30 minutes, from Bridgeport and approaching Black Island, a position where the approaches to Bridgeport would require his pilotage.

The master resumed conduct of the ship at approximately 0130, some 30 minutes before grounding, and the bridge was again manned in the same way as it was on departure from Cottrell's Cove; i.e., master, boatswain, helmsman and lookout.

The vessel's speed was maintained at her full service speed of 12 knots, the No. 1 radar was in use, but not the echo sounder. British Admirality chart number 280 on which the courses to Bridgeport were plotted was in use, and Canadian Hydrographic Service (C.H.S.) chart number 4598 which covers Bridgeport Harbour and approaches, was available for use when approaching and entering Bridgeport Harbour, however, no courses were plotted on this chart; both were situated on the chart-room table.

The weather conditions were, wind westerly 20 knots, seas 1 m, overcast with continuous light rain, visibility approximately 5 miles in darkness.

All navigating equipment and machinery was in good working order with no malfunctions either prior to or during the incident. The gyro compass, by which the helmsman was steering, contained an error of 6° low, reportedly determined by previous transit bearings, however this was known to the master and he had applied the error to courses steered.

The No. 1 radar was in use in the 'darkness colour mode', ranges being varied as required; it was on the .75 mile range at the time of the grounding.

There are no aids to navigation, such as lights, buoys or ranges in the area of Bridgeport and its approaches, therefore, navigation /pilotage was conducted by the master using radar only and with references to the chart, (C.H.S. number 4598).

The southwesterly approach to Bridgeport required a turn to port of 101° in order to round Bridgeport Point distant 1 cable (185 m) to port, then to maintain a course of 063° true towards Bridgeport. This was the intended action and would have taken the vessel midway between Bridgeport Point and Bridgeport rock at a distance of approximately 1 cable from each.

There is a group of 6 islets, named Puzzle Harbour rocks, approximately 3 cables (555 m) to the southwest of Bridgeport rock and 5 cables (925 m) from Bridgeport Point.

The radar reflected images of the islets were clearly visible on the radar P.P.I. (radar screen) and these were mistaken for those of Bridgeport rock and/or disturbed water above the rock, when in fact the rock was submerged and not radar visible. Course was altered to pass midway between Bridgeport Point and Puzzle Harbour rocks.

Having altered course to 063° true, it was then realized the ship was too far to the south and what was thought to be Bridgeport rock were in fact the islets. The helm was put to port-easy in order to close the distance off Bridgeport Point and avoid Bridgeport rock, but while the ship's head was turning to port she ran aground, at 0200 August 29, on Bridgeport rock at her full service speed of 12 knots where she remained, stranded, heading 032° true.

There remained 45 minutes to high water; the vessel was upright with no discernible list and she remained upright throughout.

Radar bearings and distances off various land masses and islets determined the vessel to be aground on Bridgeport rock.

Various helm and astern engine movements failed to refloat her.

Soundings of the double bottom tanks revealed that Nos. 1 and 2, used for sea-water ballast, were open to the sea. This was determined because the water level in the sounding pipes was at the same level as the sea and pumping

did not reduce the level. No 3 D.B., containing diesel fuel oil, was still intact with no ingress of sea-water.

Soundings of bilges indicated the holds to be dry; all other tank soundings; i.e., fore-peak, after-peak and deep tank indicated them to be undamaged.

Flotation would now depend on the strength and watertightness of the tank tops of No. 1 and 2 double bottom tanks. A slight seepage of water was observed into number 2 hold at number 2 tank top, but this was contained by the use of hold bilge pumps.

On grounding, the "TOPSAIL STAR" had draughts of 2.59 m forward and 4.15 m aft giving a mean draught of 3.37 m at approximately amidships; external soundings determined the depths of water around the ship to be:

0.91 m on both sides at the bow
1.83 m on the starboard side amidships
3.05 m on the port side amidships
7.31 m at the stern having gradually increased from amidships.

This indicated that the vessel had grounded over her length from forward to amidships and had reduced her forward draught by 1.68 m, her midships draught by 1.54 m on the starboard side and by .32 m on the port side. The after part of the ship was still afloat.

The vessel would need a rise of tide combined with a reduction of her original forward draught totalling 1.68 m in order to float free.

At the time of grounding the tide was rising and the next high water was at 0245; however, the remaining rise of tide to that time was calculated to be only 14 mm.

Comfort Cove Coast Guard Radio was advised of the incident by the "TOPSAIL STAR" at 0235 on August 29 and was again contacted by her at 0352 with the advice that she could not re-float and would await the next high water (a higher tide) at 1505 that day, when she expected the assistance of Marine Atlantic's vessel "TAVERNER". In the meantime, the deep-tank and fore-peak tank were being pumped clear of ballast.

At 0700, the deep-tank and fore-peak had been pumped, discharging approximately 167 tonnes and at 1030 the fisherman's boat and gear were discharged. The after-peak, containing approximately 15 tonnes of fresh (potable) water

had not been pumped in order to assist the ship to trim by the stern. However the action of discharging water ballast and fishing gear was not sufficient to float the vessel off the rock.

The "TAVERNER" had been directed by her owners to assist the "TOPSAIL STAR" and she arrived at the scene at 1400, on August 29. Four lines were made fast at the stern of the "TOPSAIL STAR" and from 1545 to 1700 attempts were made to tow her stern-first off the rock with the "TOPSAIL STAR" using her engines at full astern.

These attempts were unsuccessful. The only movement of the "TOPSAIL STAR" was to slew from the original heading of 032° true to 085° true. By 1730 the "TAVERNER" had parted all four lines and damage had been incurred to the "TOPSAIL STAR's" mooring fittings aft. It was then decided that the "TOPSAIL STAR" should further lighten ship by discharging her remaining cargo and some fuel oil, before making another attempt.

The "TAVERNER" was unable to assist in lightening the "TOPSAIL STAR" and at 1730 on August 29, she departed to continue her voyage.

The "KLOSTER", a smaller vessel, also chartered to Marine Atlantic, was directed by them to complete discharging her own cargo at nearby Lewisporte and to proceed to lighten the "TOPSAIL STAR". It was felt that the smaller vessel could secure to the port side of the "TOPSAIL STAR" where soundings had indicated sufficient depth of water for her draught. Her ETA at the scene was the morning of August 31.

At 1410, on August 30, the Canadian Coast Guard Ship (CCGS) "JACKMAN" was tasked to proceed to the scene in order to stand by should her assistance become necessary. She arrived and anchored at 1101 on August 31.

Concern was felt for the safety of the "TOPSAIL STAR" and her crew during August 30 as weather forecasts for the area indicated strong southwesterly winds and Bridgeport rock is very exposed to winds from that direction, fortunately, however, the wind proved to be light to moderate. The "TOPSAIL STAR" moved slightly in the resultant wave action and, although both lifeboats had been launched and other life saving appliances readied, the situation did not deteriorate to one where abandoning ship became necessary.

The weather moderated early on August 31 and a diver from nearby Lewisporte examined the ship's bottom but, because of the vessel's situation, he could only confirm that

the ship was aground from forward to amidships and damaged.

At 1115 on August 31, the "KLOSTER" completed discharging all of her remaining cargo at Lewisporte and then started to discharge sufficient of her own fuel oil in order to be able to transfer 27,000 litres of the "TOPSAIL STAR'S" fuel oil. She departed Lewisporte at 1830 and arrived at the "TOPSAIL STAR" that evening and secured along the port side of the grounded vessel. The weather had now moderated to light winds and slight seas.

By the afternoon of the following day, September 1, all of the "TOPSAIL STAR's" remaining cargo, which amounted to 41.34 tonnes, plus 7,036 litres of diesel fuel weighing 5.98 tonnes and approximately 15 tonnes of ship's equipment such as a tractor and hatch boards had been transferred to the "KLOSTER".

High water that evening occurred at 1909 with a rise of tide above datum of 1.0 m. This was a tide 0.4 m higher than the high tide which occurred immediately after grounding.

By 1800 the CCGS "JACKMAN" had secured the port anchor chain of the "TOPSAIL STAR" to her after-deck and the "KLOSTER" had secured a mooring line to the stern of the "TOPSAIL STAR". At 1824 (45 minutes before high water) both ships succeeded in towing the "TOPSAIL STAR" off the rock, stern first. The vessel having been stranded for 3 days, 16.4 hours. At 1859 the "JACKMAN" was released by the "TOPSAIL STAR".

The depth of water at the bow prior to the "TOPSAIL STAR" being towed off the rock was 1.22 m; the vessel floated at a draught of 1.29 m forward, which indicates that a further rise of tide of approximately .07 m would have been necessary for her to float free.

On re-floating the "TOPSAIL STAR" proceeded into Bridgeport Harbour under her own power and, after inspection by the Ship Safety Branch of the Canadian Coast Guard, was allowed to proceed to St. John's, Newfoundland, to effect repairs.

The "KLOSTER" escorted the "TOPSAIL STAR" from Bridgeport to the approaches to St. John's. The "TOPSAIL STAR" berthed at St. John's 2120, August 2, having experienced no further difficulties.

Analysis

1. No. 1 Radar

No. 1 radar is of a new 'Bright Track' type situated on the starboard side of the wheelhouse. The viewing unit consists of a 35.56 cm T.V. type cathode ray tube on which a 21.6 cm P.P.I. is displayed to the left. Displayed to the right, in a vertical column in digital readout are; the range in use, the fixed range marker distances apart, the electronic bearing cursor bearing and the electronic range marker distance.

Information displayed on the viewing unit is refreshed 30 times per second providing a continuous picture; there is no slight dimming of targets which occurs after the passage of the trace as on a conventional radar.

The display is presented in colour with either amber targets with a blue background for daylight use or amber targets with a black background for use in darkness.

The P.P.I. is not gyro stabilized and the heading marker is presented 'ship's-head-up'. Since all bearings taken are relative to the ship's head, the ship's heading must be applied to obtain the true bearing. The non gyro stabilized 'ship's-head-up' mode is favoured by the many navigators who frequently engage in coastal navigation and pilotage.

Inspection and tests of the radar on various ranges on the day after the grounding and while the ship was still stranded showed it to have very good bearing and distance accuracy with very good target presentation.

2. Chart in Use

The chart in use showing Bridgeport and approaches (C.H.S. 4598) was the appropriate chart, and was corrected up to date. It was used for reference purposes only. No positions or intended course lines were plotted on it, neither were there any notations as to intended distances off points of land, islets, etc.

It is a reproduction of the former British Admiralty chart 3582 which was surveyed by that Agency between the years 1881 and 1909, but had been updated with all the latest available hydrographic information.

The position of Bridgeport rock, relative to the land-mass, was checked by use of the radar while the ship was

stranded; six bearings and distances off various points over the 360° horizon were taken and then plotted on the chart in use. This placed the vessel on the northern edge of the rock where in fact, she was; indicating that the position of the rock, relative to the land, was accurately depicted on the chart.

3. **Gyro Error**

The above 6 bearings were taken relative to the direction of the ship's head by gyro compass and corrected to true bearings by the application of the reported gyro error of 6° low. They were then drawn on the chart and all of the bearings intersected at the same position which confirmed the reported gyro error to be correct.

The error was apparently mechanical and not attributable to incorrect latitude and speed settings. It had increased to 6° low from 3° low during the current voyage and the intention was to have the gyro corrected on arrival at St. John's, Newfoundland, at the end of the voyage. It is considered that the gyro error was not a contributing cause of this grounding.

4. **Pilotage System**

The system of pilotage used was one whereby the master directed the helmsman to steer courses to meet his (the master's) required distances off the land as shown on the radar; he ordered the helm to port or starboard and then to steady when the land-mass had moved to the required distance off the heading marker or range ring/range marker, the gyro course being steered was then reported to him by the helmsman.

The chart in use was situated on the chart-room table which required a walk of some 6 to 7 paces from the radar and through a doorway in order to consult it.

The initial course alteration of 101° to port in order to round Bridgeport Point was made in a succession of smaller alterations as described above and it is estimated that the total alteration took 2 minutes. After completing the turn and steering 057° gyro, 063° true in order to pass midway between Bridgeport Point and Puzzle Harbour rocks (the latter having been mistaken for Bridgeport rock), the radar heading marker and range rings showed that the vessel would pass 1.9 cables from each whereas the intended distance to pass off Bridgeport Point was 1.0 cable, leaving Bridgeport

rock 1.0 cable to the south. It was then that the error was realized and the helm put to port-easy in order to close the distance off Bridgeport Point.

The Canadian Coast Guard publication 'Recommended Code of Nautical Procedures and Practices' Part II, under the sub-title 'Navigation in Coastal Waters' states in part:

> 20... Fixes should be taken at frequent intervals; whenever circumstances allow, fixing should be carried out by more than one method.
>
> 21... The officer of the watch should positively identify all relevant navigation marks.

These operational measures were not taken.

5. Time Elapsed, Course Alterations to Grounding

There are no records of positions or times of alterations of courses, however, the distance from the position of the initial alteration to the position of grounding is approximately 1 nautical mile. At a speed of 12 knots, a distance of 1 mile is travelled in 5 minutes. The tidal condition was close to high water, therefore, tidal streams (currents) produced would have been negligible and the speeds over the ground and through the water would have been approximately the same. The existing 20 knot westerly wind would have produced negligible leeway.

It was estimated that the initial course alteration took 2 minutes, which left less than 3 minutes to assess the situation and take corrective action. It was estimated the ship had been turning to port for 30 seconds, after the order to port-easy, when she grounded, which indicates that approximately 2.5 minutes had elapsed from steering 063° true to taking corrective action.

6. Watch System and Qualifications

There were 2 qualified navigators, the master and the mate; watchkeeping duties were divided as follows:

The master kept the 8-12 watch, the mate the 4-8 watch and the boatswain the 12-4 watch; however, the master undertook all of the pilotage. He also navigated in coastal areas where he felt the boatswain or the mate required his assistance.

The master had the conduct of the ship and was in charge of the deck watch for 30 minutes before the incident; however, for approximately 60 minutes prior to the master reassuming the watch, the boatswain, who was not qualified and held no Ministry of Transport authorization, was in charge of the watch. The Ship's Deck Watch Regulations, Section 8, state in part:

(1) No person shall act or be permitted to act as master or person in charge of the deck watch on a ship of more than 100 tons unless he is

(a) the holder of a valid certificate or licence....

(5) An examiner may issue an authorization to act

(b) as person in charge of the deck watch.

However, the fact that the boatswain had been in charge of a watch had no bearing on this casualty.

7. **"TOPSAIL STAR" Work Schedule**

On the day previous to the grounding, August 28, the vessel had worked as follows:

Port	Arrival	Departure	Time in Port	Time at Sea
Red Bay	0000	0015	00 h 15 m	
Harbour Deep	1245	1330	00 h 45 m	12 h 30 m
Triton	1950	2200	02 h 10 m	06 h 20 m
Cottrell's Cove	2320	2400	00 h 40 m	01 h 20 m
			03 h 50 m	20 h 10 m

The master kept the 8-12 watch, piloted for approximately 1 hour for each port and was on duty during all of the time in each port.

In addition to other duties, those working hours were approximately:

Watchkeeping	5 h 15 m
Pilotage	4 h 00 m
Port Time	3 h 50 m
	13 h 05 m

The only time interval during the 24 hours when sound sleep would be available was the period after the pilotage on departure Red Bay at 0045 until 0800 that morning, approximately 7 hours 15 minutes of which some time would be taken in arising and breakfasting. The

time in the afternoon before arrival at Triton was occupied by ship's business and the many additional duties of a ship's master. The Safe Manning Regulations, Section 4, sub-sections 1,2,3 and 4 state in regard to navigators that they:

> (1) ... shall have a period of rest of not less than 6 consecutive hours in every calendar day...
>
> (2) in the case of a ship in which three or more watches are established, the persons in one of these watches may have the period of rest described in sub-section (1) overlapping one calendar day and the next.
>
> (3) not more than 18 hours and not less than 6 hours shall elapse between the end of a period of rest described in sub-section (1) and the beginning of the next such period of rest.
>
> (4) every person referred to in sub-section (1) shall have at least 16 hours of rest in the aggregate in every 2 consecutive calendar days ...

The term 'rest' is not defined.

After departure Cottrell's Cove, at 0000, August 29, the master had rested for 1 hour and then returned to the bridge, 30 minutes before the grounding at 0200. Technically his rest periods fell within the requirements of the Safe Manning Regulations; however, it should be taken into consideration that fatigue and stress produced by lack of sleep together with an exacting work schedule is a prime cause of human error.

In the above regard, the 'Recommended Code of Nautical Procedures and Practices' Part I, Section 5, states:

> Fitness for duty
>
> The watch system shall be such that the efficiency of watchkeeping officers and watchkeeping ratings is not impaired by fatigue. Duties shall be so organized that the first watch at the commencement of a voyage and the subsequent relieving watches are sufficiently rested and otherwise fit for duty.

8. Tidal Action and Reduction of Draught

Forward draught on grounding	2.59 m
Forward draught after grounding	.91 m
Reduction in draught	1.68 m
Forward draught at flotation, at 1824, September 1	1.22 m
Additional rise of tide at at 1824, September 1 (in excess of tidal height at grounding)	.40 m
	1.62 m

Tidal predictions for the area of grounding were extracted from the Canadian Tide and Current Tables issued by the Canadian Hydrographic Service. There are no predictions for the area of Bridgeport, therefore, the predictions for Exploits Upper Harbour were used; this is a secondary port some 7 miles away from Bridgeport whose predictions are based on the reference port of St. John's, consequently, tidal predictions for Bridgeport cannot be considered accurate but serve as a good guide to expected heights.

9. Depth Sounder

The depth sounder is the type that records depths of water under the keel; it was not in use. The 'Code of Nautical Procedures and Practices', part 2, sub-section 13, headed 'Electronic Navigational Aids' states:

> The echo sounder is a valuable navigational aid and should be used whenever appropriate.

Had it been in use, then the actual courses made good prior to grounding might have been more easily verified.

10. Weather

The weather forecast for the area, issued by Environment Canada at 2000 August 28, indicated:

> winds westerly to southwesterly 15 to 20 knots diminishing to light winds Friday (29th) visibility fair in showers and mist to poor in fog patches.

The forecast proved correct being the same as the actual

conditions for the voyage from Cottrell's Cove to the Bridgeport area with the exception that no fog patches were encountered.

11. **Crew Qualifications and Experience**

The master holds a British Master Foreign Going Certificate issued in the U.K. in 1958. A Radar Observer's course or a Simulated Electronic Navigation course was not a requisite for the above qualifications in 1958. He had 40 years seafaring experience, 29 of which were as master. He is also the owner of the "TOPSAIL STAR" and had traded as master/owner on the Newfoundland/Labrador coasts for the past 19 years. He had entered and departed Bridgeport Harbour on four previous occasions.

The boatswain held no formal marine qualifications, nor was he required to by regulations; he had approximately 20 years seafaring experience, the past 10 years as boatswain of the "TOPSAIL STAR".

The helmsman held no formal marine qualifications, nor was he required to by regulations; he had 3 years seafaring experience, all of them on the "TOPSAIL STAR".

The lookout held no formal marine qualifications, nor was he required to by regulations; he had 21 years seafaring experience, the past 5 years on the "TOPSAIL STAR".

Findings

When approaching Bridgeport Harbour, Newfoundland, during the early morning of August 29, 1986, in good weather conditions and visibility, although in darkness, and being piloted by the use of radar, the Canadian coastal cargo vessel "TOPSAIL STAR", due to a navigational error, grounded and became stranded. The discharge of all her cargo, part of her fuel oil and some of the ship's equipment together with an additional rise of tide and the assistance of two other vessels allowed her to refloat some 3.7 days later.

It would appear that the following factors contributed to the grounding:

- the failure to regularly plot the progress of the vessel on the chart against drawn course lines;

- the radar-reflected images of a group of small islets (rocks) were mistaken for a rock shoal which, although

above sea-level on occasion, was at that time submerged by the high tide and not radar detectable;

- the approach to the harbour was insufficiently pre-planned particularly in view of the fact that there were no shore based navigational aids or buoys in the area;

- the speed of the ship on her approach was excessive in that there remained insufficient time to take corrective action once the error in navigation had been ascertained; and

- the exacting nature of the ship's schedule caused the navigator to work excessive hours leading to his fatigue.

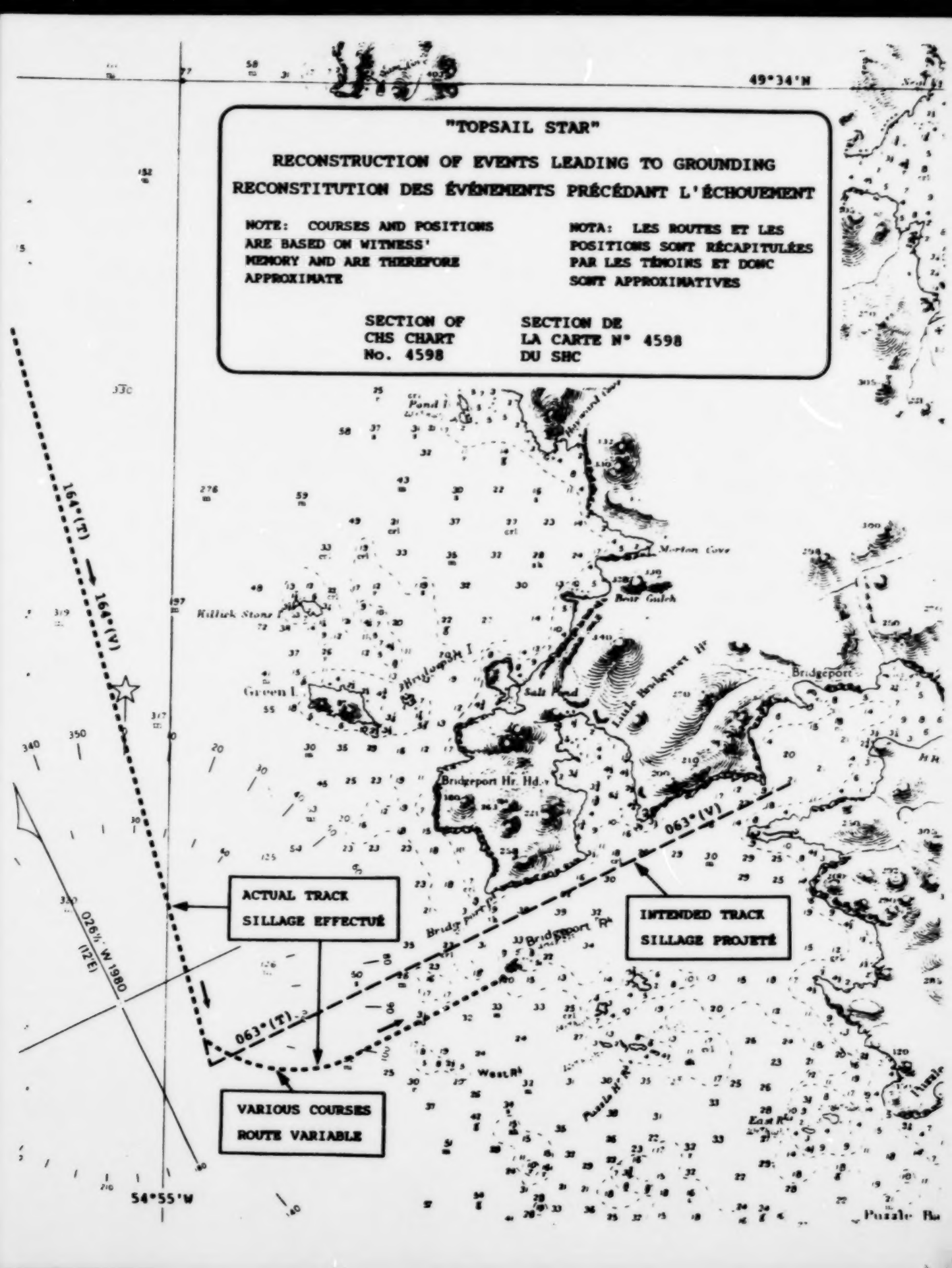
Other Findings

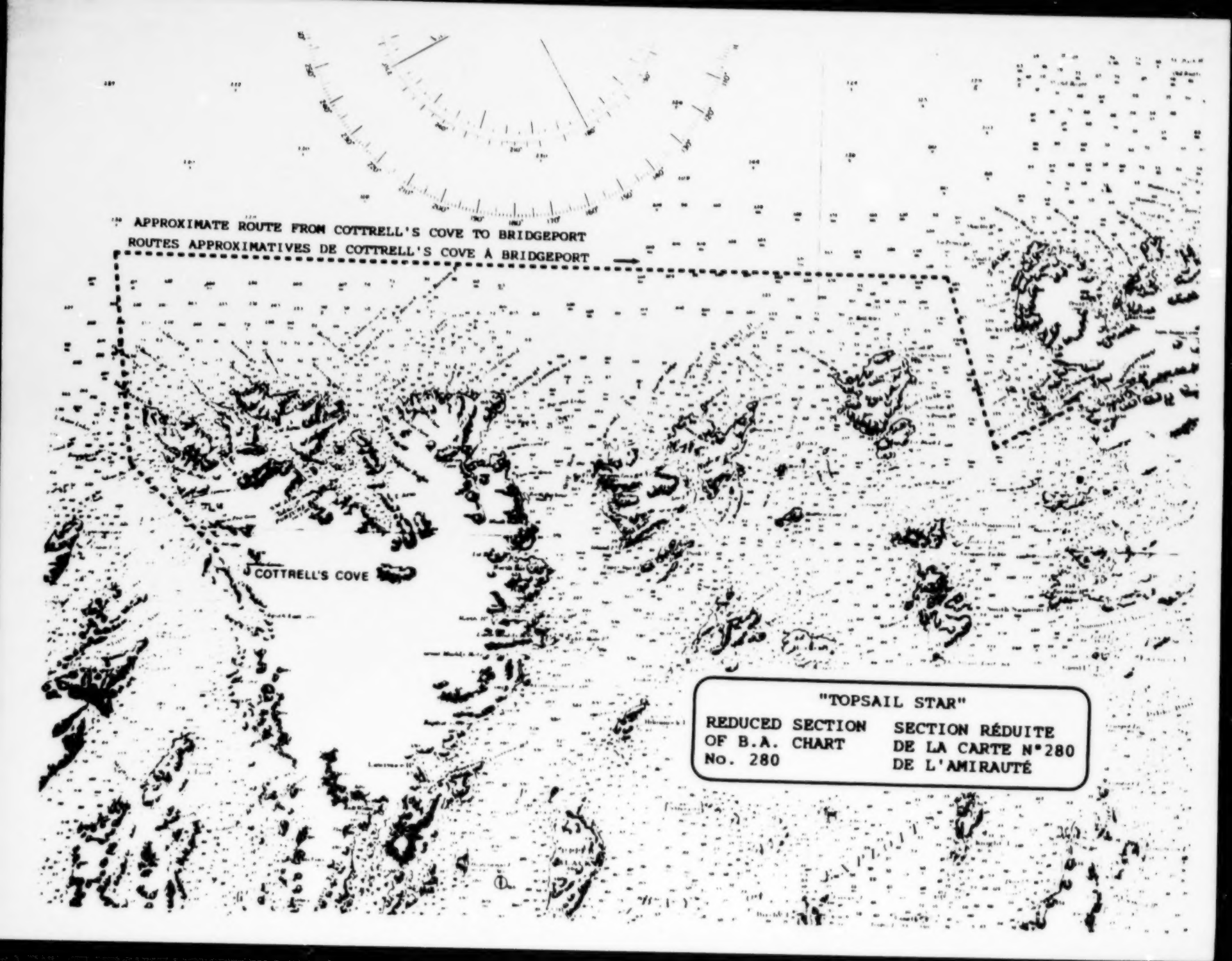
The keeping of a deck watch by an unqualified or unauthorized person is in contravention of the Ship's Deck Watch Regulations, however, this occurred at times before the incident and is not considered to have been a contributing factor to the casualty.

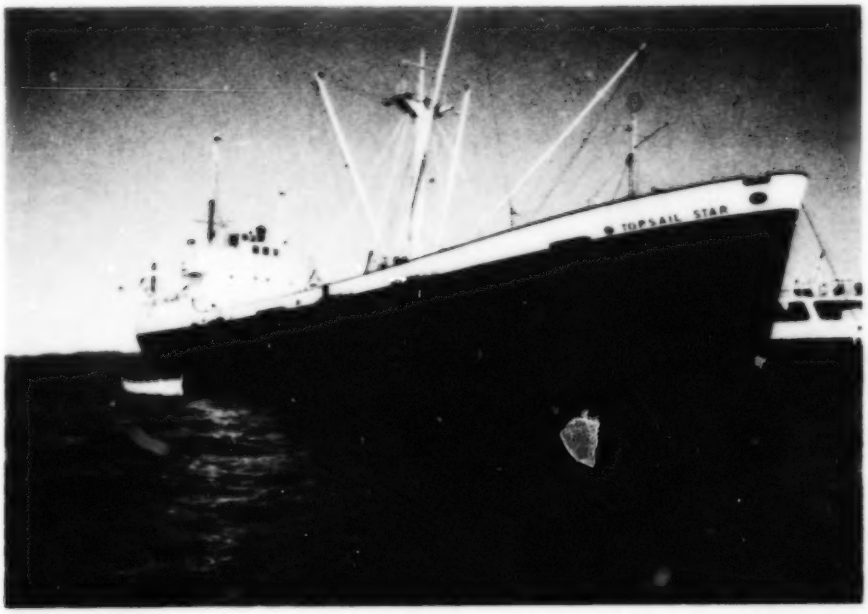
OTTAWA, ONTARIO.
APRIL 1987

Glossary

Cable	One tenth of a nautical mile, approximately 185 m
Datum	Base line from which heights of tide are measured, usually the lowest normal tide
Draught	Depth of water from keel to waterline
Knot	Unit of speed; i.e., 12 knots equals 12 nautical miles per hour
m	Metre
Outport	The name used in Newfoundland to describe the numerous small ports/communities on the coast
Pilotage	The art of conducting a vessel in or out of a harbour or in the neighbourhood of navigational dangers
P.P.I.	Plan position indicator, or radar screen
Ship's bridge	Ship's structure containing control and conning stations in wheel-house


"TOPSAIL STAR"
RECONSTRUCTION OF EVENTS LEADING TO GROUNDING
RECONSTITUTION DES ÉVÉNEMENTS PRÉCÉDANT L'ÉCHOUEMENT
NOTE: COURSES AND POSITIONS ARE BASED ON WITNESS' MEMORY AND ARE THEREFORE APPROXIMATE
NOTA: LES ROUTES ET LES POSITIONS SONT RÉCAPITULÉES PAR LES TÉMOINS ET DONC SONT APPROXIMATIVES
SECTION OF CHS CHART No. 4598
SECTION DE LA CARTE N° 4598 DU SHC
49°34'N
54°55'W
164°(T)
164°(V)
063°(V)
063°(T)
026½°W 1980 (12E)
ACTUAL TRACK
SILLAGE EFFECTUÉ
INTENDED TRACK
SILLAGE PROJETÉ
VARIOUS COURSES
ROUTE VARIABLE
Pond I
Harwood Cove
Morton Cove
Bear Gulch
Willick Stone
Green I
Salt Pond
Little Bridgeport Hr
Bridgeport
Bridgeport Hr. Hd.
Bridgeport "R"
West R
East R
Puzzle Hr
Puzzle Ra


APPROXIMATE ROUTE FROM COTTRELL'S COVE TO BRIDGEPORT
ROUTES APPROXIMATIVES DE COTTRELL'S COVE À BRIDGEPORT
COTTRELL'S COVE
"TOPSAIL STAR"
REDUCED SECTION OF B.A. CHART No. 280
SECTION RÉDUITE DE LA CARTE N°280 DE L'AMIRAUTÉ



"TOPSAIL STAR" stranded on Bridgeport rock.
NOTE: Discharging to "KLOSTER" on port side.

"TOPSAIL STAR" échoué sur la roche Bridgeport.
NOTA: Transbordement dans le "KLOSTER" sur le côté bâbord.

"TOPSAIL STAR" dry-docked, St. John's. Part of damage due to grounding.

"TOPSAIL STAR" en cale sèche à Saint-Jean (T.-N.). Une partie des avaries due à l'échouement.